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COMPARATIVE STUDY DIGITAL LITERACY HABITS OPEN DISTANCE LEARNING AND NON OPEN DISTANCE LEARNING

Husnaeni[1*], Hasanuddin[2], Jalil[3]

[1]*Mathematics Education Study Program Universitas Terbuka (INDONESIA)*
[2]*Communication Studies Program Universitas Terbuka (INDONESIA)*
[3]*Sekolah Pascasarjana Universitas Terbuka (INDONESIA)*

[*]husnaeni@ecampus.ut.ac.id

Abstract

The rapid advancement of digital technology has profoundly transformed the landscape of higher education, necessitating robust digital competencies among students, especially in distance learning environments. This study aims to compare the digital habits of students enrolled in Open and Open Distance Learning (ODL) with those of students attending Conventional Higher Education institutions (Non-ODL) in Indonesia. A quantitative survey approach was employed, utilizing a 30-item Likert-scale questionnaire that measures four primary dimensions of digital habits: technical digital skills, digital information literacy, utilization of academic digital tools/resources, and digital habits in the context of mathematics learning. The survey collected responses from 90 participants (50 ODL students and 40 Non-ODL students). Data analysis included descriptive statistics, normality tests, and comparative analysis using the Mann-Whitney U Test for both overall and dimension-specific scores. The results indicate that, on average, ODL students scored slightly higher in total digital habit scores than their Non-ODL counterparts; however, this difference was not statistically significant. Further analysis at the dimension level revealed significant differences in two key areas. First, ODL students exhibited significantly higher scores in the dimension of technical digital skills ($p = 0.011$), indicating superior competence in operating computers, using various software, troubleshooting, and managing digital data. This advantage is likely attributed to the self-directed and technology-driven nature of distance learning, which compels students to become more adaptive and proactive in utilizing digital tools. Second, Non-ODL students demonstrated significantly higher proficiency in the utilization of academic digital tools and resources, such as artificial intelligence (AI), Google Scholar, and Mendeley ($p = 0.027$). This finding may reflect the benefit of greater access to campus facilities and direct guidance from instructors in conventional learning environments. No significant differences were observed in digital information literacy or mathematics-related digital habits between the two groups, suggesting that basic digital literacy and the use of digital resources for mathematics learning are relatively equivalent across both modes of education. These findings underscore the importance of targeted interventions: distance learning institutions should enhance the integration and promotion of academic digital tools (such as AI and reference management software) for their students, while conventional universities should further develop students' technical digital skills. Higher education institutions are encouraged to systematically incorporate digital literacy training into their curricula and academic services, thereby preparing students for the demands and opportunities of the digital era.

Keywords: academic digital tools, comparative study digital habits, digital literacy, distance learning, higher education, Indonesia

1 INTRODUCTION

Digital literacy has been developed since 1990 and has become a pressing need for today's society. In its development, digital literacy has been defined as an individual's interest, attitude, and ability to use digital technology and communication tools to access, manage, integrate, analyze, and evaluate information, build new knowledge, create, and communicate with others in order to participate effectively in society. Digital literacy activities have historically been synonymous with a person's ability to use and understand the benefits of information and communication technology, for example, in supporting education and the economy. Digital literacy, on the other hand, is defined as a combination of the ability to find, evaluate, utilize, share, and create content using technology and the internet (Cornell University, 2009). The implementation of digital literacy is an effort or activity that goes beyond mastery of computer technology and internet skills, which connotes the transformation of humans into mere robots. It encompasses a broader concept, integrating "literacy" and "digital."

The development of digital literacy has become an academic requirement at every level of education in Indonesia, particularly in higher education. Students today are addicted to it because they often search Google rather than open books as references. This shows that the internet offers various needs in seeking information (Juliana Kurniawati, 2016). The development of technology and information has brought students as the current generation into the world of digital literacy. The current development of technology and information is expected to be able to encourage students to better utilize digital literacy in the academic field. One of the benefits that can be taken from this development of technology and information is that students can access more up-to-date educational information. There are three reasons why digital literacy is important for students: (1) improving the quality of learning & teaching; (2) supporting future careers; and (3) global existence.

Digital literacy in learning is an essential skill in today's technological era that enables students to access, utilize, and understand information digitally. This includes the ability to use technological tools such as computers and the internet, as well as critical skills in evaluating and using information obtained from digital sources. In distance education, digital literacy helps students learn independently, collaboratively, and effectively using various digital resources. It is also crucial to prepare them for the challenges of a workplace that increasingly relies on technology. This is in line with the opinion of Maphosa & Bhebhe

(2019) & Rahman et al. (2020), who stated that integrating digital literacy into the curriculum is essential, especially to prepare students to face the challenges of an increasingly digital workplace.

Technology has transformed the way students access information. With good digital literacy, students can easily find reliable academic sources, such as scientific journals, research articles, and e-books. This skill enables them to deepen their understanding of course material and conduct research more effectively. For example, students with good digital literacy can distinguish between valid and invalid sources, avoid plagiarism, and utilize digital tools to record, summarize, and even analyze data.

Currently, the use of digital literacy in learning has become a major focus in education, as reflected in recent research in national and international journals. These studies show that digital literacy not only improves access and efficiency of learning but also contributes to the development of students' critical and analytical skills. Abrosimova (2020) emphasizes the importance of digital literacy in higher education, the opportunities and risks associated with the digitalization of education, and the concept of blended learning as an optimal solution. There is an increasing integration of digital technologies in curricula, emphasizing the importance of teaching students how to use digital resources critically and ethically. This change reflects the broader educational need to prepare students for an increasingly digital world, including distance learning students.

In distance learning environments like UT, digital literacy has proven critical in supporting academic achievement and student adaptation to dynamic learning environments, as discussed in various studies (Aruta, 2018; Wulandari, 2022; Tzifopoulos, 2020). These skills facilitate access to diverse learning resources and enhance cognitive and technical competencies essential for academic and professional success (Yundri Akhyar, 2021; Ozdamar-Keskin et al., 2015). However, research by Husnaeni et al. (2024) found that UT students' academic achievement was not significantly influenced by digital literacy, such as economic conditions and infrastructure support, within the context of their analysis.

2 METHODOLOGY

This research employed a descriptive quantitative approach. Data were collected by distributing a questionnaire using a Likert scale and sending it via Google Forms to students enrolled in open-learning programs (PTJJ) across several areas of the UT-Makassar region. For non-PTJJ students, the questionnaire was collected face-to-face. The data were then

analyzed using non-parametric statistics using SPSS-25, with the results described in tables and figures.

The population and sample of this study were 90 people, 50 of whom were non-PTJJ students who took online tutorials on educational statistics, fundamentals of mathematics & science, and elementary school mathematics. Meanwhile, 40 non-PTJJ students took mathematics courses from universities in Makassar, such as: Makassar State Islamic University (UIN), Makassar Islamic University (UIM), and the Nobel Indonesia Institute.

The research variables have 4 dimensions, namely: technical skills (X1), information literacy (X2), digital academic tools (X3), and digital mathematics (X4) which are then processed using SPSS version 25. The data analysis of this research includes descriptive statistics, normality tests, and comparative analysis using the Mann-Whitney U test for overall scores and based on dimensions. The Mann-Whitney U test is a non-parametric statistical test used to compare two independent or unrelated groups in both groups coming from the same population. This test is often used as an alternative to the independent t-test when the data is not normally distributed.

3 FINDINGS AND DISCUSSION

This analysis divides students' digital habits into four main dimensions: Digital Technical Skills, Digital Information Literacy, Utilization of Digital Academic Tools/Resources, and Digital Habits in Mathematics. Each dimension is measured through several questionnaire items, with an average score calculated for each respondent and compared between UT students, referred to as Distance Learning (PTJJ) students, and students from non-UT (conventional) universities, referred to as non-PTJJ students.

Table 1 presents the results of the statistical test (Mann-Whitney U Test) for the average scores for each dimension in both groups. Meanwhile, Figure 1 shows a visual comparison graph of the average scores for each dimension.

Table 1. Statistical Test Results Per Dimension of Digital Habits of Distance Learning and Non-Distance Learning Students

Dimensions	PTJJ Students (Average)	Non-PTJJ Students (Average)	p-value	Significant (p<0,05)
Technical Skills	3.96	3.72	0.011	Yes
Information Literacy	3.89	3.73	0.058	No
Digital Academic Tools	3.28	3.66	0.027	Yes
Digital Mathematics	3.79	3.82	0.903	No

Description: The numbers in the 'Significant' column indicate whether there is a significant difference between the PTJJ and Non-PTJJ student groups on that dimension (based on the Mann-Whitney U Test).

The results of the study in Table 1 show that the average significance value between the Technical Skills variable and the variable for the use of Digital Academic Tools/Resources shows the same level of significance, with a tendency for differences, but has not yet reached the required level of significance ($p < 0.05$). Similarly, the Information Literacy variable and the Digital Mathematics variable show no significance but have not yet reached the required level of significance or $p < 0.05$. Further analysis at the dimension level reveals significant differences in two main areas. First, PTJJ students show significantly higher scores on the technical digital skills dimension ($p = 0.011$) which indicates better competence in operating computers, using various software, troubleshooting, and managing digital data. Meanwhile, Non-PTJJ students show a significantly higher level of mastery in the use of academic tools/digital resources, such as artificial intelligence (AI), Google Scholar, and Mendeley ($p = 0.027$).

The findings of this study indicate that the achievements of both groups are relatively equal in the following variables: Technical Skills (X1), Digital Information Literacy Dimension (X2), Digital Academic Tools/Resources Utilization Dimension (X3), and Digital Mathematics Habits Dimension (X4). Specifically, the Dimension of Digital Academic Tools/Resources Utilization (X3) variable, which is approaching significance, indicates that internal student factors such as self-directed learning readiness (SDLR) play an important role. To clarify the results of the comparison of the average scores of all dimensions of digital habits of PTJJ and Non-PTJJ students, it can be presented as in Figure 1 below.

Figure 1. Comparison Graph of Average Scores of Digital Habits Dimensions of PTJJ and Non-PTJJ Students

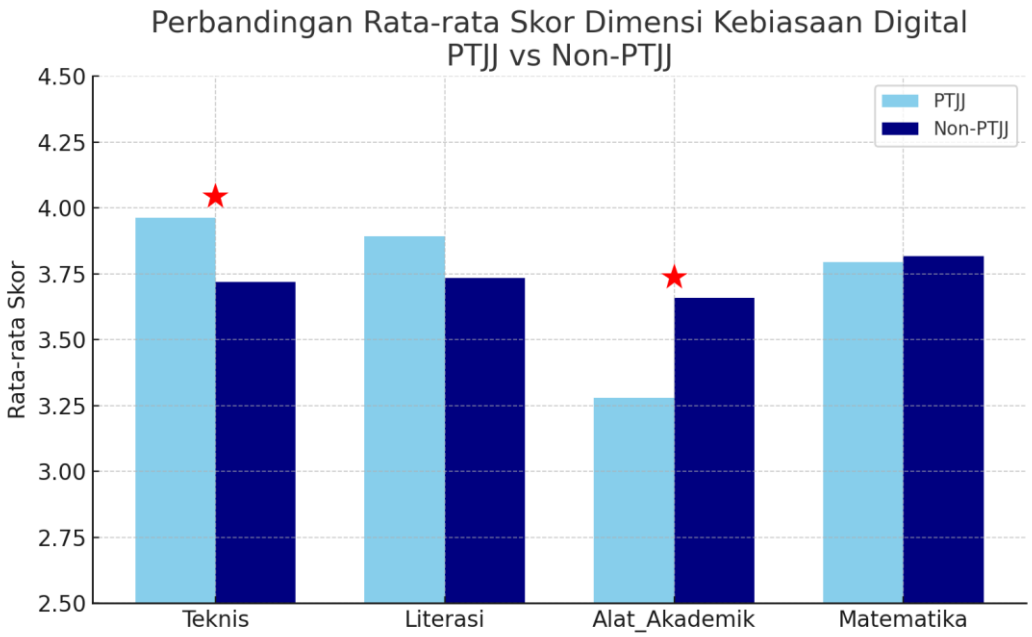

Figure 1 shows a comparison of the average scores for each dimension of digital habits between PTJJ (sky blue) and non-PTJJ (sea blue) students. Dimensions marked with a red asterisk (*) indicate significant differences ($p < 0.05$).

The results of statistical tests indicate significant differences in two key dimensions of students' digital habits. First, students enrolled in distance learning programs (PJJ) had a significantly higher average score for digital technical skills ($p = 0.011$). This indicates they are more proficient in computer use, software, troubleshooting, and digital data management. This advantage is likely due to the need for independent and flexible learning in distance learning systems, which require students to be more adaptive and actively utilize digital technology. Second, the utilization of digital academic tools/resources such as AI (chatGPT, Gemini, etc.), Google Scholar, and Mendeley was significantly higher among non-UT students ($p = 0.027$). This phenomenon may be attributed to the learning habits of students on conventional campuses, who are relatively more accustomed to utilizing campus resources and facilities, or receiving direct guidance from lecturers on the use of modern academic tools. Students today live in an evolving digital world that requires enhanced abilities and skills to use and adapt digital tools (Knobel & Lankshear, 2010).

Meanwhile, in digital information literacy (e.g., sorting and citing information, evaluating digital sources) and digital habits in mathematics (accessing materials, discussions, educational mathematics videos, etc.), no significant differences were found between the two

groups of students. This indicates that basic information literacy skills and the use of technology for mathematics learning are relatively equivalent, regardless of the learning model used. In general, the results of this study confirm that the development of students' digital skills is influenced not only by the learning system (distance vs. face-to-face), but also by the technology ecosystem, access to digital tools, and academic habits in each higher education environment. Buckingham (2010) explains that digital literacy in the classroom is more than simply integrating technology into teaching; students who learn through guided digital tools implement and create rich learning systems and develop an understanding of the cultural forms with which they interact inside and outside of school. Furthermore, digital literacy requires critical thinking skills, an awareness of appropriate behaviors expected in online environments, and an understanding of the social issues created by technology and the digital environment.

Several researchers have begun examining and assessing digital literacy for academic purposes. In 2016, Ukwoma, Iwundu, and Iwundu examined the digital literacy skills possessed and used by students at the University of Nigeria Nsukka (UNN) to complete academic work. The results showed that strong digital literacy skills can improve academic performance. Four years earlier, Shariman et al. (2012) previously examined digital literacy competence for academic needs among students from three universities in Malaysia. The study found that students already possessed good digital literacy competence for everyday purposes, but their digital literacy competence for academic purposes was still limited, such as students still having difficulty evaluating the accuracy of information obtained for learning purposes. Several existing studies have shown that digital literacy for academic purposes is important and needs to be studied more comprehensively and in-depth.

According to Abrosimova (2020), digitalization has led to a significant increase in the selection of study programs and disciplines available for study and international and interdisciplinary collaboration in science and research. Education is even more accessible and individualized, providing the freedom to conduct research and enhance independent learning. Similarly, students studying online and independently are highly required to maximize their digital literacy skills because most of their learning must be accessed online. However, according to data on the modern digital education environment in the Russian Federation, there is a less optimistic side to this change. Like any other transformation, the digitalization process in education carries several risks, including: (1) low levels of trust and determination

among students and academics to use digital content; (2) low efficiency in implementing digitalized teaching methods; (3) low activity of entrepreneurs and investors in supporting the development of high-quality digital content (Abrosimova, 2020).

However, research by Wulandari (2022) found that digital literacy significantly improves students' academic achievement. Similarly, Akhyar et al. (2021) found a positive and significant influence of digital literacy on elementary school students' science learning outcomes and emphasized the importance of digital integration in education to improve learning outcomes, especially in the context of distance learning. Research by Yusri Wahyuni et al. (2022) showed that students generally had a high level of digital literacy in Geogebra-based mathematics learning, although some still needed guidance in technical and cognitive aspects. This study provides insight into the importance of digital literacy in modern mathematics education. However, research by Husnaeni et al. (2024) found that the academic achievement of UT students taking mathematics courses was not significantly influenced by digital literacy, economic conditions, and infrastructure support. Therefore, intervention from each institution is expected to provide maximum digital literacy skills so that it can contribute to student academic improvement, including in mathematics courses. Specifically, this study measures and examines precisely the digital literacy habits of PTJJ students and non-PTJJ students in the mathematics course group.

The findings of this study provide important recommendations for higher education institutions, namely the need to strengthen digital technical skills training for non-PTJJ students, as well as the socialization and increased utilization of digital academic tools/resources (such as AI, Google Scholar, Mendeley) for PTJJ students in general and in mathematics courses. Institutions are also expected to be more proactive in integrating digital literacy into the curriculum and academic services to prepare students to face the dynamics of digital technology developments in the modern learning era.

4 CONCLUSION

The results of this study found no significant differences between the two groups of students (PTJJ students and non-PTJJ students). This indicates that basic information literacy skills and the use of academic technology for mathematics learning are relatively equivalent, regardless of the learning model followed in mathematics courses at each student's campus. In general, the results of this study add to the empirical evidence that in the context of distance learning (such as UT) and face-to-face (non-UT), there is not always a significant impact on

academic achievement, as long as students have adequate learning readiness. These findings emphasize the importance of targeted interventions at PTJJ institutions to improve the integration and promotion of academic digital tools (such as AI and reference management software) for their students, while conventional universities (non-PTJJ) need to further develop their students' technical digital skills. Universities are encouraged to systematically integrate digital literacy training into their curricula and academic services, thereby preparing students for the demands and opportunities of the digital era.

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